AMENDMENTS TO THE CLAIMS

1. (original) A cathodoluminescent element comprising:

at least one emitter;

a first transistor having a first terminal coupled said at least one emitter, a second terminal coupled to a ground potential, and a gate terminal, said first transistor being responsive to a first voltage applied to said gate terminal to selectively establish a first conductive path for a first current between said at least one emitter and said ground potential;

a programmable element having a first terminal coupled to a first select line to receive a first select signal, a second terminal coupled to said gate terminal of said transistor, and a gate terminal coupled to a second select line, said programmable element being responsive to assertion of a second select signal on said second select line to selectively establish a second conductive path for a second current between said first select line and said gate terminal of said transistor, thereby applying said first voltage to said gate terminal of said transistor;

wherein said programmable element comprises a charge storage element for storing a level of electrical charge;

and wherein the conductivity of said second conductive path varies in relation to said level of electrical charge such that the magnitude of said first voltage relative to the magnitude of said second select signal varies in relation to said level of electrical charge.

2. (original) A cathodoluminescent element in accordance with claim 1, wherein said programmable element is a floating gate transistor.

3. (original) A cathodoluminescent element in accordance with claim 1, further comprising an infrared-sensitive element disposed along said first current path, the conductivity of said infrared-sensitive element varying in relation to levels of exposure to infrared radiation such that the magnitude of said first current varies in relation to levels of exposure to infrared radiation.

4. (original) A cathodoluminescent element in accordance with claim 3, wherein said infrared sensitive element comprises platinum silicide.

5. (original) A cathodoluminescent element in accordance with claim 1, further comprising a conductive element proximal to said at least one emitter, said conductive element adapted to draw electrons from said at least one emitter when said transistor establishes said first conductive path.

6. (original) A cathodoluminescent element in accordance with claim 5, further comprising an anode spaced apart from said conductive element, said anode adapted to attract said electrons drawn from said at least one emitter by said conductive element.

7. (original) A cathodoluminescent element in accordance with claim 6, further comprising a phosphor layer applied to said anode, said phosphor layer being responsive to electrons attracted by said anode to emit light.

8. (original) A cathodoluminescent element in accordance with claim 1, wherein said at least one emitter is disposed on a silicon substrate.

9. (original) A cathodoluminescent element in accordance with claim 7, wherein the intensity of said light emitted from said phosphor layer varies in proportion to levels of infrared radiation to which said infrared sensitive element is exposed.

10. (original) A field emission display, comprising an array of cathodoluminescent elements each comprising:

at least one emitter;

a first transistor having a first terminal coupled said at least one emitter, a second terminal coupled to a ground potential, and a gate terminal, said first transistor being responsive to a first voltage applied to said gate terminal to selectively establish a first conductive path for a first current between said at least one emitter and said ground potential;

a programmable element having a first terminal coupled to a first select line to receive a first select signal, a second terminal coupled to said gate terminal of said transistor, and a gate terminal coupled to a second select line, said programmable element being responsive to assertion of a second select signal on said second select line to selectively establish a second conductive path for a second current between said first select line and said gate terminal of said transistor, thereby applying said first voltage to said gate terminal of said transistor;

wherein said programmable element comprises a charge storage element for storing a level of electrical charge;

and wherein the conductivity of said second conductive path varies in relation to said level of electrical charge such that the magnitude of said first voltage relative to the magnitude of said second select signal varies in relation to said level of electrical charge.

11. (original) A field emission display in accordance with claim 10, wherein each said programmable element is a floating gate transistor.

12. (original) A field emission display in accordance with claim 10, further comprising, for each cathodoluminescent element, an infrared-sensitive element disposed along said first current path, the conductivity of said infrared-sensitive element varying in relation to levels of exposure to infrared radiation such that the magnitude of said first current varies in relation to levels of exposure to infrared radiation.

13. (original) A field emission display in accordance with claim 10, further comprising, for each cathodoluminescent element, a conductive element proximal to said at least one emitter, said conductive element adapted to draw electrons from said at least one emitter when said transistor establishes said first conductive path.

14. (original) A field emission display in accordance with claim 13, further comprising an anode spaced apart from said array of cathodoluminescent elements, said anode adapted to attract said electrons drawn from each of said at least one emitter by respective ones of said conductive elements.

15. (original) A field emission display in accordance with claim 14, further comprising a phosphor layer applied to said anode, said phosphor layer being responsive to electrons attracted by said anode to emit light.

16. (original) A field emission display in accordance with claim 15, further comprising, for each cathodoluminescent element, an infrared-sensitive element disposed along said first current path, the conductivity of said infrared-sensitive element varying in relation to levels of exposure to infrared radiation to which it is exposed, such that the magnitude of said first current varies in relation to levels of exposure to infrared radiation to which said infrared-sensitive element is exposed, and such that the intensity of said light emitted by said phosphor layer varies in relation to levels of infrared radiation to which said infrared-sensitive element is exposed.

17. (original) A field emission display in accordance with claim 10, wherein each of said at least one emitter is disposed on a silicon substrate.

18. (original) A method of operating a cathodoluminescent element comprising an emitter selectively coupled to ground in response to application of a predetermined voltage to the gate of a transistor, said method comprising:

(a) conditioning a programmable element associated with said cathodoluminescent element to level compensate a first select signal to said predetermined voltage level in response to application of a second select signal to a gate terminal of said programmable element;

(b) applying said level-compensated first select signal to said gate of said transistor.

19. (original) A method in accordance with claim 18, wherein said programmable element is a floating-gate transistor.

20. (original) A method in accordance with claim 19, wherein said step (a) of conditioning comprises storing an electrical charge on the floating gate of said floating gate transistor.

21. (original) A method in accordance with claim 20, further comprising:

(c) prior to said step (a) of conditioning said programmable element, applying said first select signal to said gate of said transistor without level compensation to cause electrons to be emitted from said emitter; and

(d) determining a desired magnitude of said stored electrical charge based upon the intensity of electron emission from said emitter while said first select signal is applied to said gate of said transistor.

22. (original) A method of operating a field emission display comprising an array of cathodoluminescent devices each comprising an emitter selectively coupled to ground in response to application of a predetermined voltage to the gate of a transistor, said method comprising:

(a) for each cathodoluminescent element in said array, conditioning an associated programmable element to level compensate a first select signal to said predetermined voltage level in response to application of a second select signal to a gate terminal of said programmable element;

(b) applying said level-compensated first select signal to said gate of said transistor in response to application of said second select signal to said gate terminal of said programmable element.

23. (original) A method in accordance with claim 22, wherein said each programmable element is a floating-gate transistor.

24. (original) A method in accordance with claim 23, wherein said step (a) of conditioning comprises storing an electrical charge on the floating gate of said floating gate transistor.

25. (original) A method in accordance with claim 24, further comprising:

(c) for each cathodoluminescent element in said array, prior to said step (a) of conditioning said programmable element, applying said first select signal to said gate of said transistor without level compensation to cause electrons to be emitted from said emitter; and

(d) for each cathodoluminescent element in said array, determining a desired magnitude of said stored electrical charge based upon the intensity of electron emission from said emitter while said first select signal is applied to said gate of said transistor.

26. (original) A cathodoluminescent element, comprising:

at least one emitter;

a transistor coupled between said at least one emitter and a ground potential;

a programmable element having a first terminal coupled to said gate of said transistor, a second terminal adapted to receive a select signal having a predetermined voltage level, and a third terminal adapted to receive a control signal,

wherein said programmable element is responsive to activation of said control signal to adjust said predetermined voltage level of said select signal by a preprogrammed amount and apply said adjusted select signal to a gate of said transistor;

and wherein said transistor is responsive to application of said adjusted select signal to said gate to couple said at least one emitter to said ground potential.

27. (original) A cathodoluminescent element in accordance with claim 26, wherein said programmable element comprises a charge storage device for storing a level of electrical charge thereon.

28. (original) A cathodoluminescent element in accordance with claim 27, wherein said preprogrammed amount is determined by said level of electrical charge.

29. (original) A cathodoluminescent element in accordance with claim 28, wherein said charge storage device comprises a floating gate of a floating gate transistor.

30. (original) A cathodoluminescent element in accordance with claim 26, further comprising a conductive element proximal to said at least one emitter, said conductive element adapted to draw electrons from said at least one emitter when said transistor couples said at least one emitter to ground.

31. (original) A cathodoluminescent element in accordance with claim 30, further comprising an anode spaced apart from said conductive element, said anode adapted to attract said electrons drawn from said at least one emitter.

32. (original) A cathodoluminescent element in accordance with claim 31, further comprising a phosphor layer applied to said anode, said phosphor layer being responsive to electrons attracted by said anode to emit light.

33. (original) A cathodoluminescent element in accordance with claim 26, further comprising an infrared-sensitive element disposed between said transistor and said ground potential.

34. (original) A cathodoluminescent element in accordance with claim 32, further comprising an infrared-sensitive element disposed between said transistor and said ground potential.

35. (original) A cathodoluminescent element in accordance with claim 34, wherein the intensity of said light emitted by said anode varies in relation to levels of infrared radiation to which said infrared-sensitive element is exposed.

36. (original) A cathodoluminescent element in accordance with claim 35, wherein said infrared-sensitive element is platinum silicide.

37. (original) A field emission display, comprising an array of cathodoluminescent elements each comprising:

at least one emitter;

a transistor coupled between said at least one emitter and a ground potential;

a programmable element having a first terminal coupled to said gate of said transistor, a second terminal adapted to receive a select signal having a predetermined voltage level, and a third terminal adapted to receive a control signal,

wherein said programmable element is responsive to activation of said control signal to adjust said predetermined voltage level of said select signal by a preprogrammed amount and apply said adjusted select signal to a gate of said transistor;

and wherein said transistor is responsive to application of said adjusted select signal to said gate to couple said at least one emitter to said ground potential.

38. (original) A field emission display in accordance with claim 37, wherein said each programmable element comprises a charge storage device for storing a level of electrical charge thereon.

39. (original) A field emission display in accordance with claim 38, wherein said each preprogrammed amount is determined by said level of electrical charge.

40. (original) A field emission display in accordance with claim 39, wherein said charge storage devices comprise floating gates of respective floating gate transistors.

41. (original) A field emission display in accordance with claim 37, further comprising, for each cathodoluminescent element, a conductive element proximal to said at least one emitter, said conductive element adapted to draw electrons from said at least one emitter when said transistor couples said at least one emitter to ground.

42. (original) A field emission display in accordance with claim 41, further comprising, for each cathodoluminescent element, an anode spaced apart from said conductive element, said anode adapted to attract said electrons drawn from said at least one emitter.

43. (original) A field emission display in accordance with claim 42, further comprising a phosphor layer applied to said anode, said phosphor layer being responsive to electrons attracted by said anode to emit light.

44. (original) A field emission display in accordance with claim 37, further comprising, for each cathodoluminescent element, an infrared-sensitive element disposed between said transistor and said ground potential.

45. (original) A field emission display in accordance with claim 43, further comprising, for each cathodoluminescent element, an infrared-sensitive element disposed between said transistor and said ground potential.

46. (original) A field emission display in accordance with claim 45, wherein, for each cathodoluminescent element, the intensity of said light emitted by said anode varies in relation to levels of infrared radiation to which said infrared-sensitive element is exposed.

47. (original) A field emission display in accordance with claim 46, wherein said infrared-sensitive element is platinum silicide.

48. (original) A field emission display in accordance with claim 46, wherein said array of cathodoluminescent elements is adapted to present an image corresponding to infrared radiation levels to which said display is exposed.

49. (original) A field emission display, comprising:

an array of cathodoluminescent elements each being responsive to a separate select signal to emit electrons toward an anode having a phosphor layer applied thereon, such that light is selectively emitted from said phosphor layer; and

for each cathodoluminescent element in said array, a programmable element for determining a level of voltage adjustment to said separate select signal, such that said programmable element determines the intensity of light emitted from said phosphor layer.

50. (original) A field emission display in accordance with claim 49, wherein for each cathodoluminescent element, said programmable element comprises a charge storage device for storing a level of electrical charge thereon.

51. (original) A field emission display in accordance with claim 50, wherein for each cathodoluminescent element, said charge storage device comprises a floating gate of a floating gate transistor.

52. (original) A field emission display in accordance with claim 51, further comprising, for each cathodoluminescent element, an infrared-sensitive element for modulating said intensity of light emitted by said phosphor layer in proportion to levels of infrared radiation to which said each cathodoluminescent element is exposed.

53. (original) A method of operating a field emission display comprising an array of cathodoluminescent elements each having a programmable element associated therewith and each responsive to a separate select signal having a predetermined voltage level to cause light to be emitted from said display at a respective location in said array corresponding to said each cathodoluminescent element, comprising:

(a) separately for each cathodoluminescent element is said array, pre-programming said programmable element to specify the intensity of light emitted by said display at said respective location in said array corresponding to said each cathodoluminescent element in response to application of said separate select signal corresponding to said each cathodoluminescent element.

54. (original) A method in accordance with claim 53, wherein for each said cathodoluminescent element in said array, said step of pre-programming comprises storing a desired level of electric charge on a charge storage device.

55. (original) A method in accordance with claim 54, wherein said step of storing a desired level of electric charge comprises storing said desired level of electric charge on a floating gate of a floating gate transistor.

56. (currently amended) A field emission display device comprising:

a ~~photoelectric conversion device including a~~ p-type substrate defining an upper surface;~~,~~

a~~n~~ first n-type doped region formed in said p-type substrate at said upper surface of said p-type substrate;~~,~~

a~~n~~ second n-type ~~guard ring~~ doped region spaced from said first n-type doped region and formed in said p-type substrate at said upper surface of said p-type substrate;~~,~~ ~~and~~

an electrically conductive metallic film formed over said upper surface of said p-type substrate and in contact with the first and second n-type doped regions~~, wherein said p-type substrate and said metallic film are arranged to define a metal-semiconductor Schottky barrier~~;

an electrically conductive grid~~-structure~~;

an electrically conductive anode structure; and

an electron emitter conductively coupled to said ~~photoelectric conversion device~~first n-type doped region, wherein said at least one electron emitter and said grid ~~structure~~ are displaced from said anode structure across a field emission region~~, and wherein said field emission region is defined in a vacuum~~.

57. (currently amended) A field emission display device as claimed in claim 56 wherein said electron emitter is formed over said first n-type doped region~~of said upper surface of said p- type substrate~~.

58. (currently amended) A field emission display device as claimed in claim 57 wherein said electron emitter is formed integrally with said first n-type doped region~~of said upper surface of said p-type substrate~~.

59. (currently amended) A field emission display device as claimed in claim 56 wherein said electron emitter comprises a tip~~-defining an emission apex~~.

60. (currently amended) A field emission display device as claimed in claim 56 wherein said ~~emitter comprises a plurality of tips defining respective emission apexes~~ anode structure comprises a phosphor coated screen.

61. (currently amended) A field emission display device as claimed in claim 56 wherein said metallic film is platinum silicide~~formed over at least a portion of said n-type doped region of said upper surface of said p-type substrate and over at least a portion of said n-type guard ring region of said upper surface of said p-type substrate~~.

62. (currently amended) A field emission display device as claimed in claimed 56 wherein said metallic film and said p-type substrate comprise an infra-red-sensitive junction~~comprising:~~

~~a photoelectric conversion device including~~

~~a p-type silicon substrate defining an upper surface,~~

~~an n-type doped region formed in said p-type silicon substrate at said upper surface of said p-type substrate,~~

~~an n-type guard ring region spaced from and surrounding said n- type doped region and formed in said p-type silicon substrate at said upper surface of said p-type substrate, and~~

~~a platinum silicide metallic film formed over said upper surface of said p-type substrate, wherein said p-type substrate and said metallic film are arranged to define a metal-semiconductor Schottky barrier, and wherein said metallic film extends over an interior circumferential portion of said guard ring region and an exterior circumferential portion of said n- type doped region;~~

~~an electrically conductive grid structure;~~

~~an electrically conductive anode structure including a phosphor screen; and~~

~~a plurality of electron emitter tips integrally formed with said n-type doped region and conductively coupled to said photoelectric conversion device via said platinum silicide metallic film, wherein said electron emitter tips and said grid structure are displaced from said anode structure across a field emission region, and wherein said field emission region is defined in a vacuum~~.

63. (currently amended) A field emission display device as claimed in claimed 56 further comprising a dielectric layer between the grid and the metallic film~~comprising:~~

~~a photoelectric conversion device including~~

~~a p-type silicon substrate defining an upper surface and a plurality of emitter tip profiles including respective emission apexes,~~

~~an n-type guard ring region spaced from and surrounding said plurality of emitter tip profiles and formed in said p-type silicon substrate at said upper surface of said p-type substrate, and~~

~~a platinum silicide metallic film formed over said upper surface of said p-type substrate and said emitter tip profiles, wherein said p-type substrate and said metallic film are arranged to define a metal–semiconductor Schottky barrier, and wherein said metallic film extends over an interior circumferential portion of said guard ring region;~~

~~a silicon dioxide dielectric layer formed over a portion of said metallic film spaced from said plurality of emitter tip profiles;~~

~~an electrically conductive grid structure separated from said metallic film and said substrate by said dielectric layer and arranged to define a portion of an emitter tip void spaced from and surrounding said plurality of emitter tip profiles; and~~

~~an electrically conductive anode structure including a phosphor coated screen, said anode structure being spaced from said grid structure and said plurality of electron emitter tip profiles to define a field emission region, wherein said field emission region is defined in a vacuum~~.